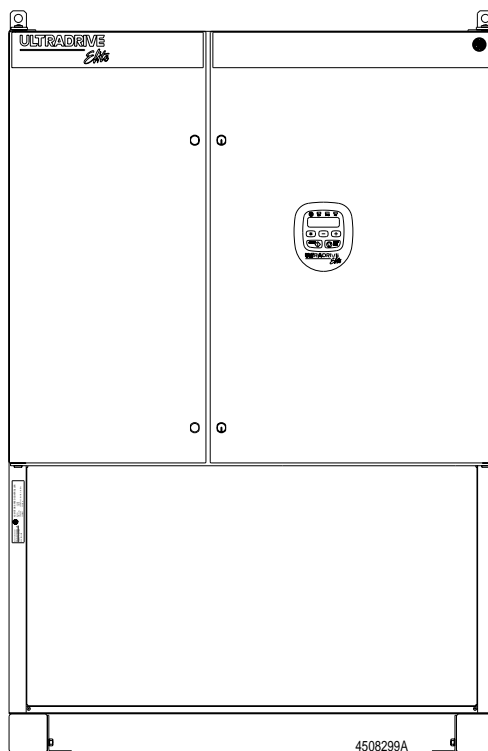


6.0 FRAME 6 ULTRADRIVE ELITE SERVICE

This section covers 400V models from UE-305 to UE-480 and 500V models from UE-305D to UE-540D.

The 400V and 500V models are essentially identical for disassembly and reassembly purposes. When specific differences exist between the 400V and 500V models these are noted.



CONTENTS

6.1	PARTS LISTS AND BLOCK DIAGRAMS	100
6.2	SERVICE	104



6.1 PARTS LISTS AND BLOCK DIAGRAMS

6.1.1 FRAME 6 400V ULTRADRIIVE ELITE PARTS LIST

400 VOLT ULTRADRIVE ELITE PARTS LIST						
Frame Size	FRAME 6				Spares Guide	
Model	UE-305	UE-340	UE-420	UE-480	*Level 1	**Level 2
Display Unit	E480-620S					
Control Board	E000-610S				1	1
Power Tray	E660-611S				1	1
SCR Board	6 x E660-615S					4
SCR Loom	2721-091					
AC Power to Power Tray Loom	2721-124					
Rectifier Block	6 x 1421-027					4
Rectifier Thermstrate	6 x 1781-103					4
IGBT Block	24 x 1757-136		24 x 1757-135			8
IGBT Thermstrate	24 x 1781-104					8
Gate Drive Board	3 x E480-612S					2
DC Bus Capacitors	24 x 1352-453		36 x 1352-453			
Capacitor Sealing Rings	24 x 3907-004		36 x 3907-004			
External Fans	4 x 2941-011				1	1
Main Internal Fans	2 x2941-006				1	1
Power Tray Fan	2941-014				1	1
DC Bus Fuse	6 x 3302-615		6 x 3302-616			6
Input Fuses	6 x 3302-615				6	6
SCR Board Fuse	6 x 2401-025				6	6
DC Power Supply Board Fuses	2 x 2404-063				2	2
Power Supply Board	E660-621S (Includes Fuses)					
Thermal Sensor Boards	12 x E660-619S					4
Thermal Sensor Looms	Loom To Power Board 1 x 2726-105					1
	Short Linking Loom 4 x 2721-114					3
	Long Linking Loom 2 x 2726-103					1
DC Power to Power tray Loom	2721-094					
DCCT	3 x 2521-073		3 x 2521-088			
Bus Sharing PCB	6 x 0371-609					
Fibre Optic Loom UH, UL & VL	3 x 2727-018 (715mm)					
Fibre Optic Loom UL & WL	2 x 2727-016 (370mm)					
Fibre Optic Loom WL	1 x 2727-017 (620mm)					
					* Level 1: Minimum spares stock	
					**Level 2: Typical spares stock	
					4508277A	

Figure 6.1 : Frame 6 400V Parts List



6.1.3 FRAME 6 500V ULTRADRIVE ELITE PARTS LIST

500 VOLT ULTRADRIVE ELITE PARTS LIST						
Frame Size	FRAME 6				Spares Guide	
Model	UE-305D	UE-370D	UE-440D	UE-540D	*Level 1	**Level 2
Display Unit	E480-620S					
Control Board	E000-610S					1
Power Tray	E661-611S				1	1
SCR Board	6 x E661-615S				2	4
SCR Loom	2721-088					
AC Power to Power Tray Loom	2721-124					
Rectifier Block	6 x 1421-040				2	4
Rectifier Thermstrate	6 x 1781-103				2	4
IGBT Block	24 x 1757-136		24 x 1757-135		4	8
IGBT Thermstrate	24 x 1781-104				4	8
Gate Drive Board	3 x E481-612				1	2
DC Bus Capacitors	24 x 1352-552		36 x 1352-552			
Capacitor Sealing Rings	24 x 3907-004		36 x 3907-004			
External Fans	5 x 2941-024		5 x 2941-022			1
Main Internal Fans	2 x 2941-012					1
Power Tray Fan	2941-014					1
DC Bus Fuse	6 x 3302-615		6 x 3302-500			6
Input Fuses	9 x 3302-615				6	6
SCR Board Fuse	6 x 2401-025				6	6
Power Supply Board Fuses	2 x 2404-063				2	2
Power Supply Board	E660-621S (Includes Fuses)					
Thermal Sensor Boards	12 x E000-619S					4
Microtherm Including Loom	6 x 2721-101					
Thermal Sensor Looms	Loom To Power Board 1 x 2726-105					1
	Short Linking Loom 4 x 2721-114					3
	Long Linking Loom 2 x 2726-103					1
DC Power to Power tray Loom	2721-094					
DCCT	3 x 2521-073	3 x 2521-088	3 x 2521-072			
Bus Sharing PCB	6 x 0371-609					
Fibre Optic Loom UH, UL & VL	3 x 2727-018 (715mm)					
Fibre Optic Loom UL & WL	2 x 2727-016 (370mm)					
Fibre Optic Loom WL	1 x 2727-017 (620mm)					
External Fan P/S Transformer	2571-067					1
External Fan P/S Board	E000-648					1
					* Level 1: Minimum spares stock	
					**Level 2: Typical spares stock	
					4508-278A	

Figure 6.3: Frame 6 500V Parts List



6.2 SERVICE

6.2.1 SERVICING THE CONTROL BOARD

- 1) Ensure the Elite is safe to work, see section 4.2 before proceeding.
- 2) Number the three way controls to enable easy replacement then unplug them and remove the control cable clamps if used.
- 3) Referring to figure 6.5 access to the wiring looms on the lower left hand side by removing screws A (3 off CW M4x10) retaining this plate.
- 4) Unplug the 7 wiring looms under the plate.
- 5) Remove the remaining cover plates in one assembly by removing screws B, 3 off M4x10. Slide the cover plate assembly down to clear the fibre-optic connections before lifting it clear.
- 6) Referring to Figure 6.6, the Control board is held by the Phillips screws C, 3 off M4x10 screws. Remove these and lift the control board vertically off the connecting pins.
Note: lift beside the plugs and keep the board level to avoid bending the connecting pins.
- 7) 500V models have a drive select board between the Control board and the Power tray, leave this in place.
- 8) The replacement Control board will be in biscuit format i.e. it will have to be trimmed to the same size as the existing board size as per figure 6.8. This is done with a fine pair of side cutters.
- 9) Place the Control board on the connecting pins
- 10) Gently push the 6 pin connector down slightly and repeat the process with the 40 pin connector. When this is completed, check through the slots to ensure no connecting pins are showing or damaged then push the Control board completely home. Replace the 3 off M4x10 Phillips screws as per figure 6.6.
- 11) Replace the remaining components of the Elite in the opposite order as detailed in removing the Control board.

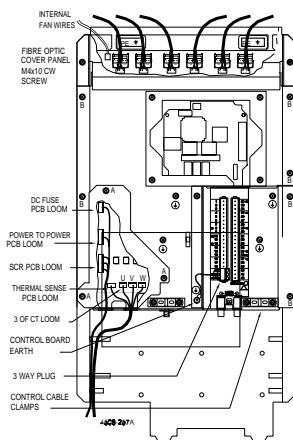


Figure 6.5: Frame 5 to 7 Power Tray

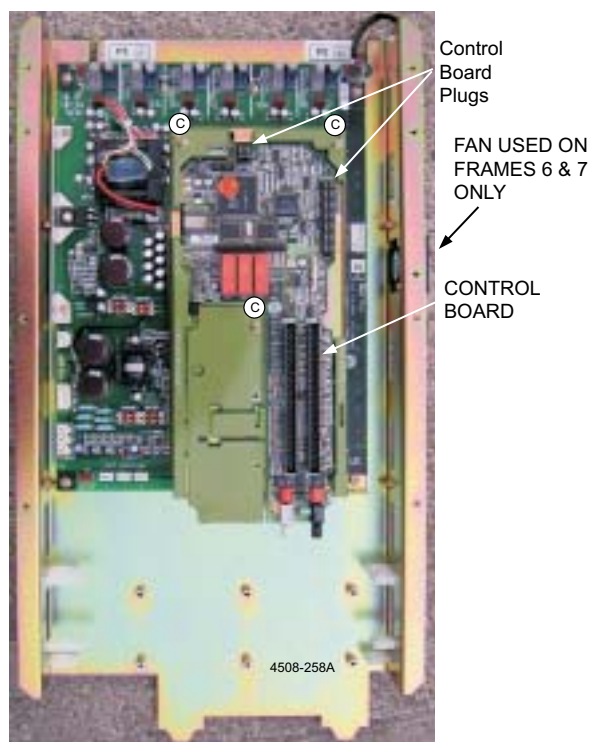


Figure 6.6: Frame 5 to 7 Power Tray and Control Board

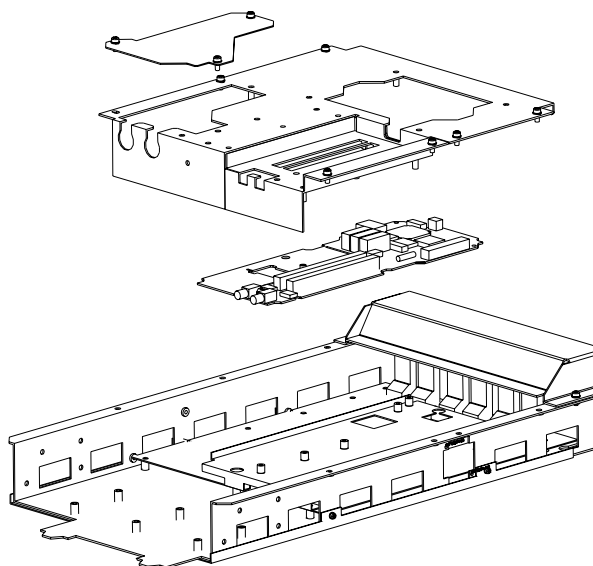


Figure 6.7: Frame 5 to 7 Power Tray Exploded View

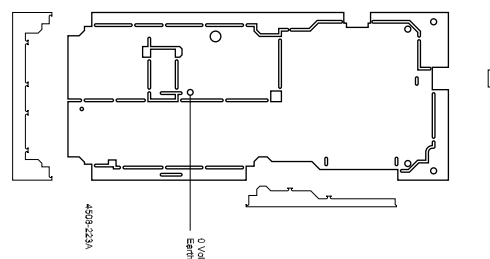


Figure 6.8: Frame 4 to 7 Control Board Biscuit

6.2.2 SERVICING THE POWER TRAY

The Power Electronics board is replaced as an entire assembly, that is, inclusive of the mounting tray. This assembly is referred to as the Power tray.

- 1) See section 6.2.1 on removing Control board.
- 2) When the Control board has been removed, put it onto the new Power tray. For 500V models, move the Drive Select board to the new Power Tray, see figure 6.10. For 400V models, this can be done after the Control board is in place, see figure 6.9.

Referring to figure 6.11.

- 3) Remove any customising items that may have been fitted in the space provided on the mounting tray.
- 4) Remove the lexan shield over the fibre optic looms.
- 5) At the top of the Power tray remove the wired connectors UL to WH (do not pull on the cables) then remove the fibre optic plugs UL to WH.
- 6) Unplug the internal fan plug from the top left of the Power tray.
- 7) Loosen the two off Power Tray retaining screws and lift the Power tray clear.
- 8) Place the new Power tray in the Elite and replace the wiring looms etc. in the opposite order that they were removed. Take care that the connectors are replaced without crossing phases, and without inadvertently off setting pins. The fibre optic looms and circuit board are marked to ensure the connections are made correctly. Particular care must be taken with the fibre optic looms to avoid a bending radius of less than 35mm.
- 9) Replace the lexan shield over the fibre optic looms.

Before mains powering the Elite, it is recommended to Soft Power the Elite to test the new parts are functioning correctly without risk of damage should something else be faulty or an error made during reassembly. See section 4.6.

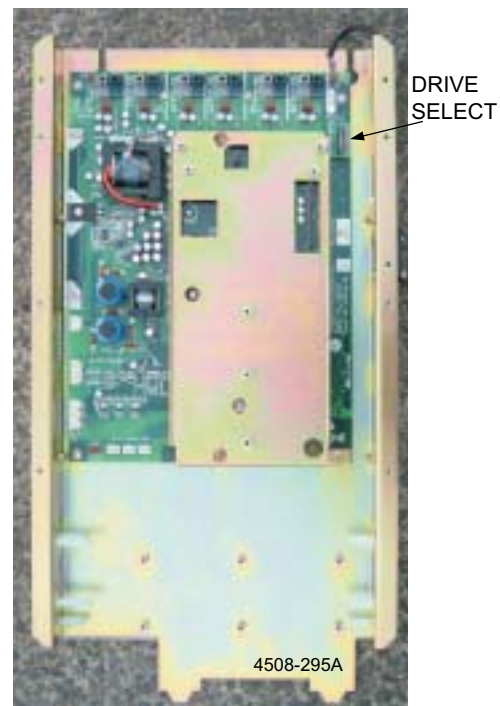


Figure 6.9: 400V Power tray

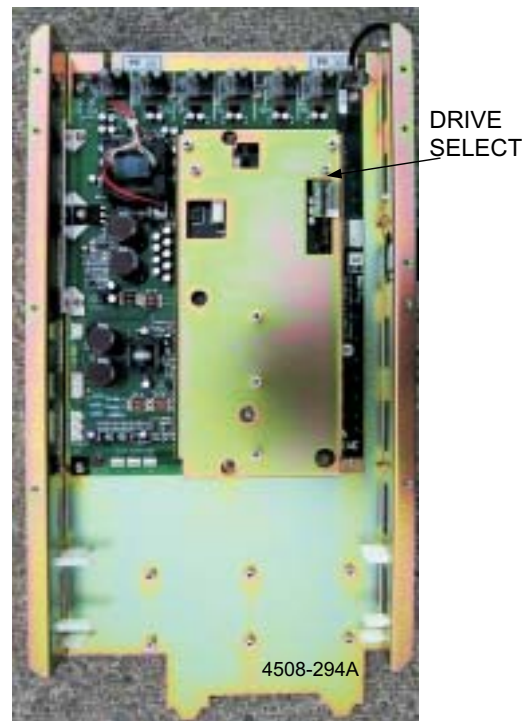


Figure 6.10: 500V Power tray

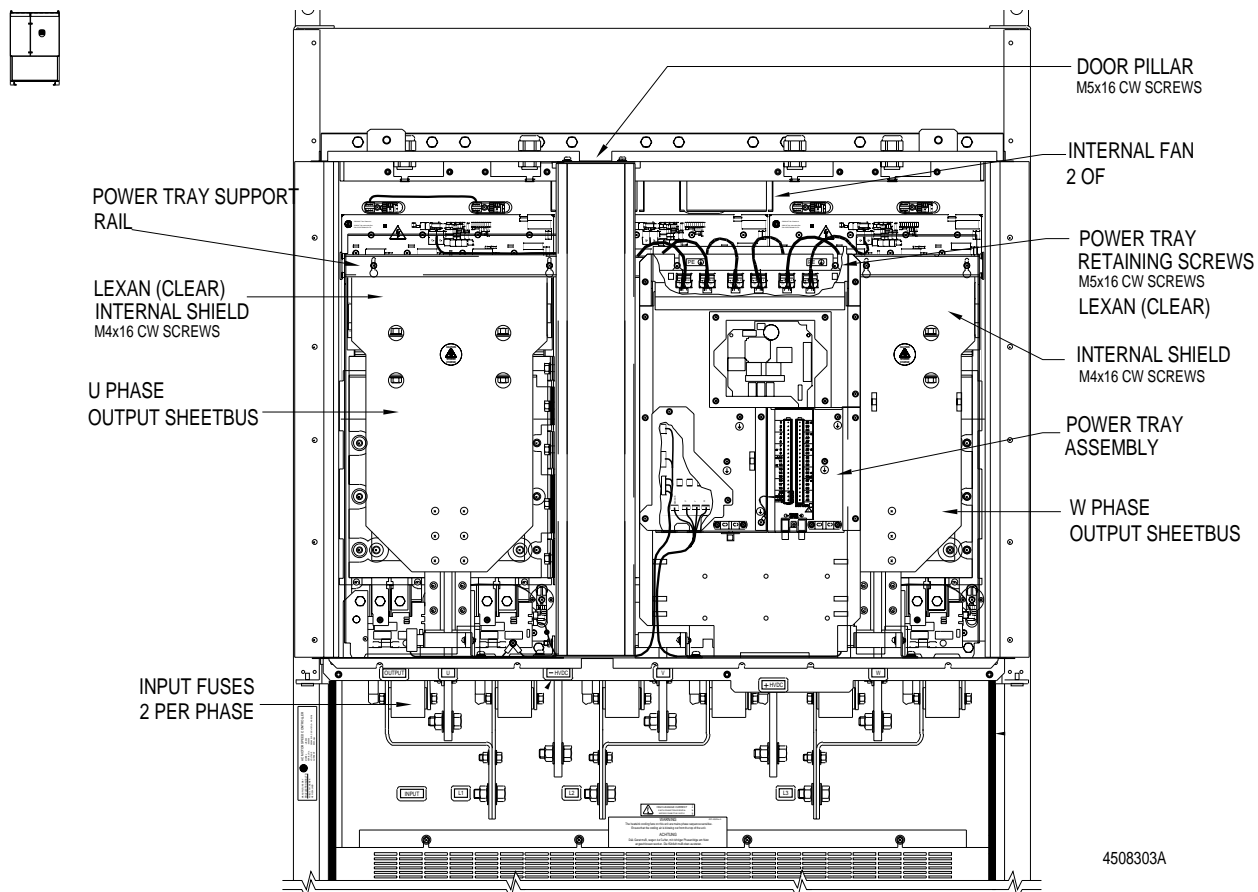


Figure 6.11: Frame 6 Power Tray Removal

6.2.3 SERVICING THE OUTPUT SHEET BUS

Frame 6 construction allows one phase to be disassembled without affecting the other two. This section and the following describe how to disassemble U Phase. The other two phases are similar in construction.

Ensure you have adequate small containers to place the Bus Sharing Board, DC Supply Board, positive Sheet Bus and negative Sheet Bus fixings in their own container. This will help to speed up reassembly.

To remove the U Phase output Sheet Bus remove:

- 1) The door pillar which is held by 8 off M5x16 CW screws. See figure 6.12.
- 2) The Lexan shield 2 off M5x 6 CW screws. See figure 6.12.
- 3) Screws A and B.
- 4) Bolts C and D.

Thread the fibre optic loom through the output Sheet Bus.

Slide the output busbar towards the bottom of the Elite (do not slide it completely through the grommet). If it is sticking use some soapy water.

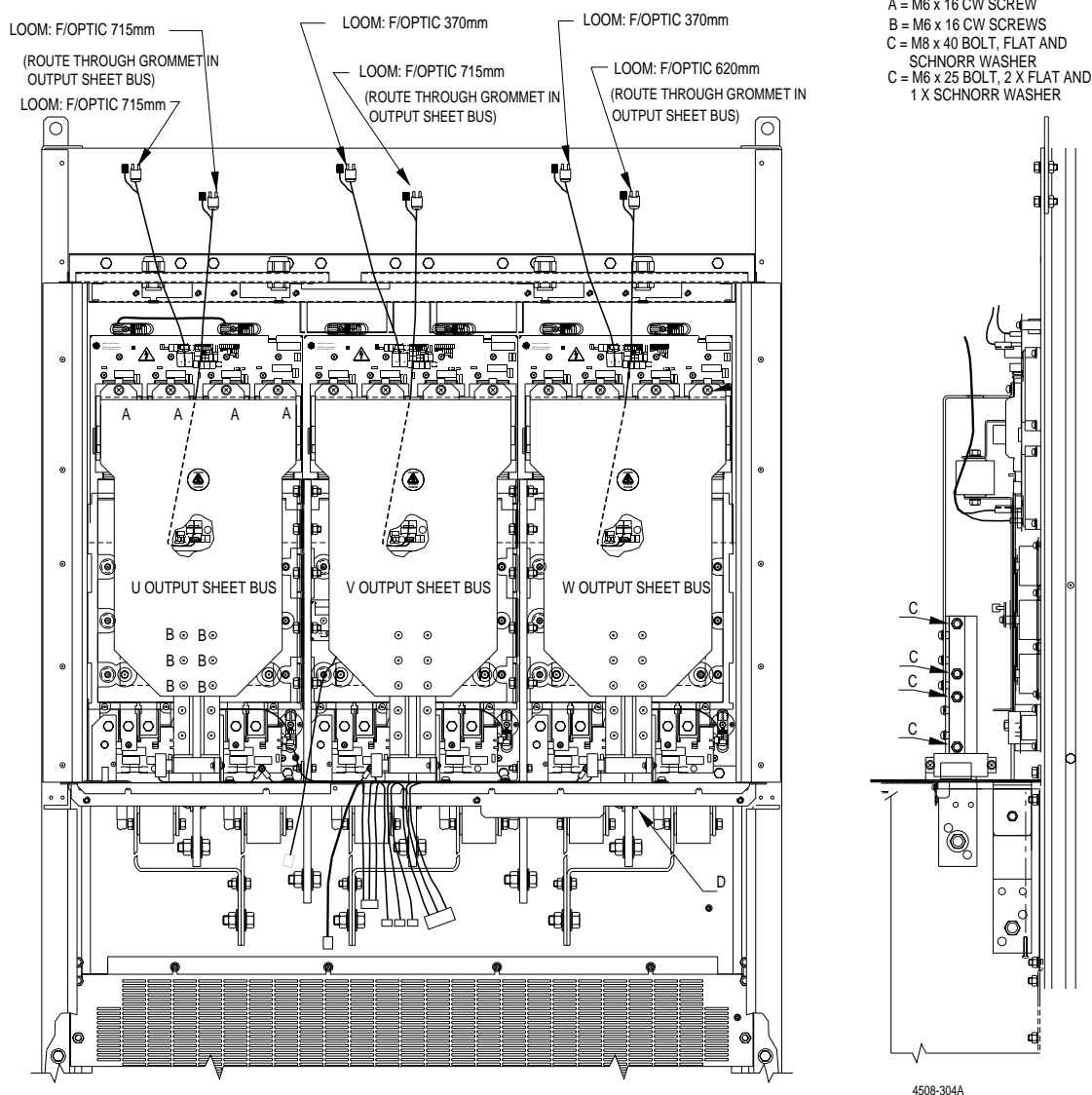


Figure 6.12: Frame 6 Output Sheet Bus Removal



6.2.4 SERVICING THE POSITIVE AND NEGATIVE SHEET BUS

Bus Sharing and Power Supply Board Removal

Refer to figure 6.13 and 6.14.

- 1) Remove the Bus Sharing boards and Bus Sharing cable. These two assemblies are secured with 6 off M5x30 CW screws and use 6 off 16mm long brass spacers. It is best to remove them as a full assembly keeping the screws and spacers together, this makes for easier reassembly.
- 2) Remove the Power Supply board, this is secured by 4 off M5x30 CW screws and has four brass spacers. The outer two spacers are 16mm long and the inner pair are 16.8 mm long. It is best to remove them as a one assembly keeping the screws and spacers together, this makes for easier reassembly.
- 3) It is not necessary to unbolt the DC Bus fuses as the positive Sheet Bus can be removed as one piece.

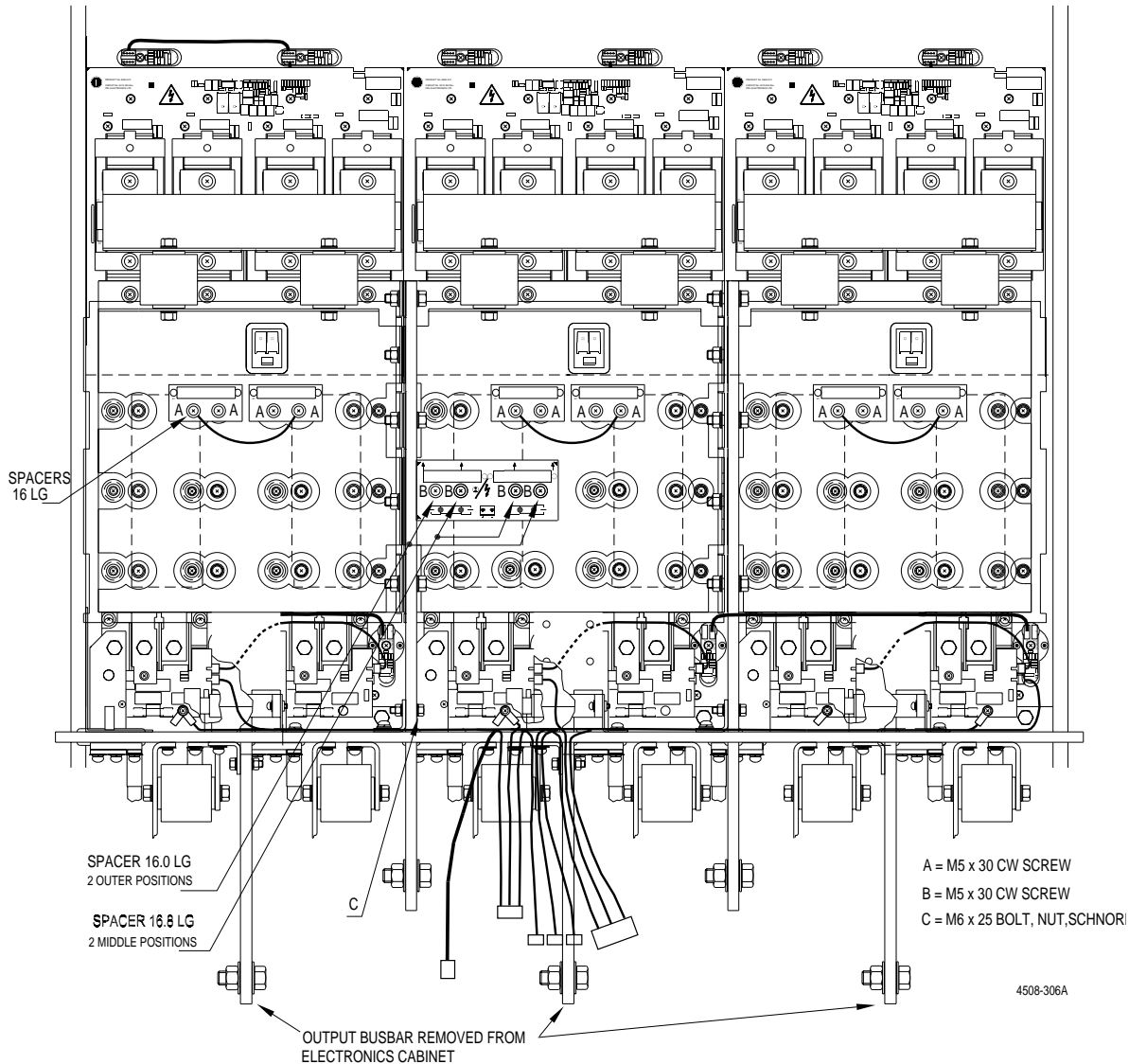


Figure 6.13: Frame 5 Positive and Negative Sheet Bus

Positive and Negative Sheet Bus Removal



Note: This drawing has been labelled to assist more with reassembly than disassembly.

- 1) Remove the DC output busbar by removing:

See figure 6.14. and remove bolts J, these bolts connect the positive output busbar to the positive Sheet Bus.

See figure 6.13. and remove bolts C where the busbar exits the electronics cabinet.

Slide the busbar into the termination area, do not slide it completely through the grommet (use soapy water if it is sticking)

Refer to figure 6.14.

- 2) Remove the positive Sheet Bus starting from screws F to J and the positive Sheet Bus joining bolts.
- 3) Remove the negative Sheet Bus Starting from screws B to E and the negative Sheet Bus joining bolts.
- 4) If you are not going to change the capacitors do not remove the cap centre Sheet Bus (screws A)

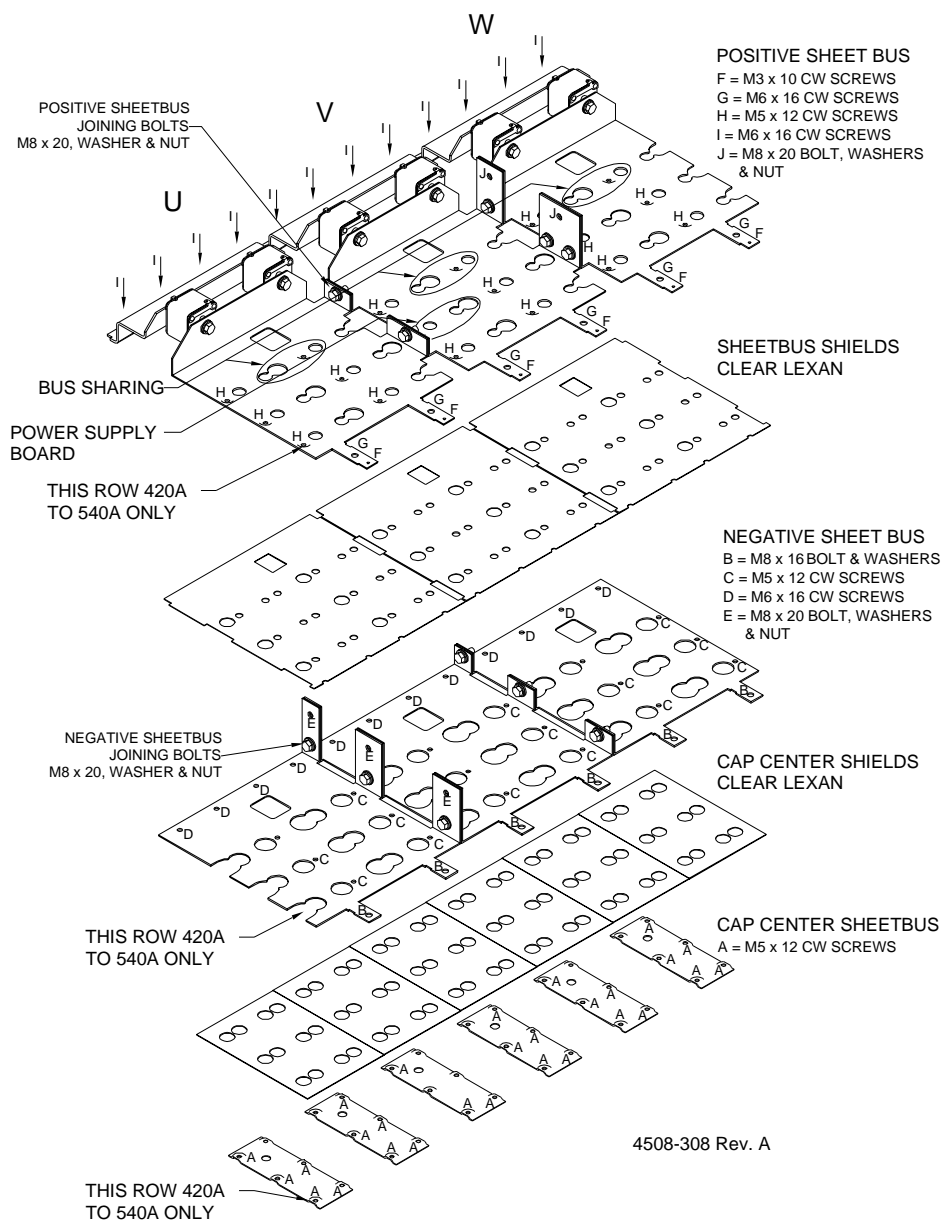


Figure 6.14: Frame 5 Positive and Negative Sheet Bus 3D View



6.2.5 SERVICING THE IGBT GATEDRIVE BOARD

Ensure you have a means of shorting out the gate and emitter of the IGBTs before you remove the Gatedrive board.

Refer to the upper section of figure 6.14.

- 1) Remove screws (A) 2 off, (B) 8 off and (C) 1 off on the phase you require access to and lift off the Gatedrive board.
- 2) Short out the gate and emitter on the IGBTs.

6.2.6 SERVICING THE SCR BOARD

Refer to the lower section of figure 6.14.

- 1) To get access to the SCR Board, first remove the DCCT and DCCT mounting bracket as one assembly. The bracket is held by 2 off M4x12 CW screws. Lay the DCCT and bracket carefully to one side.
- 2) Remove the choke rectifier busbar fixings D, E and F then slide the Bar through the grommet just enough to allow access to the SCR Board. It is best to avoid pulling out the Bus Bars if possible, as they can be difficult to put back in (use soapy water if necessary).
- 3) Remove the screws G and H unplug P1 (**Note:** P1 and P2 are common connections to the SCR gate).
- 4) The SCR Board is now only held to the SCR by male spade terminals. The SCR Board can now be lifted vertically off the SCR/diode block.

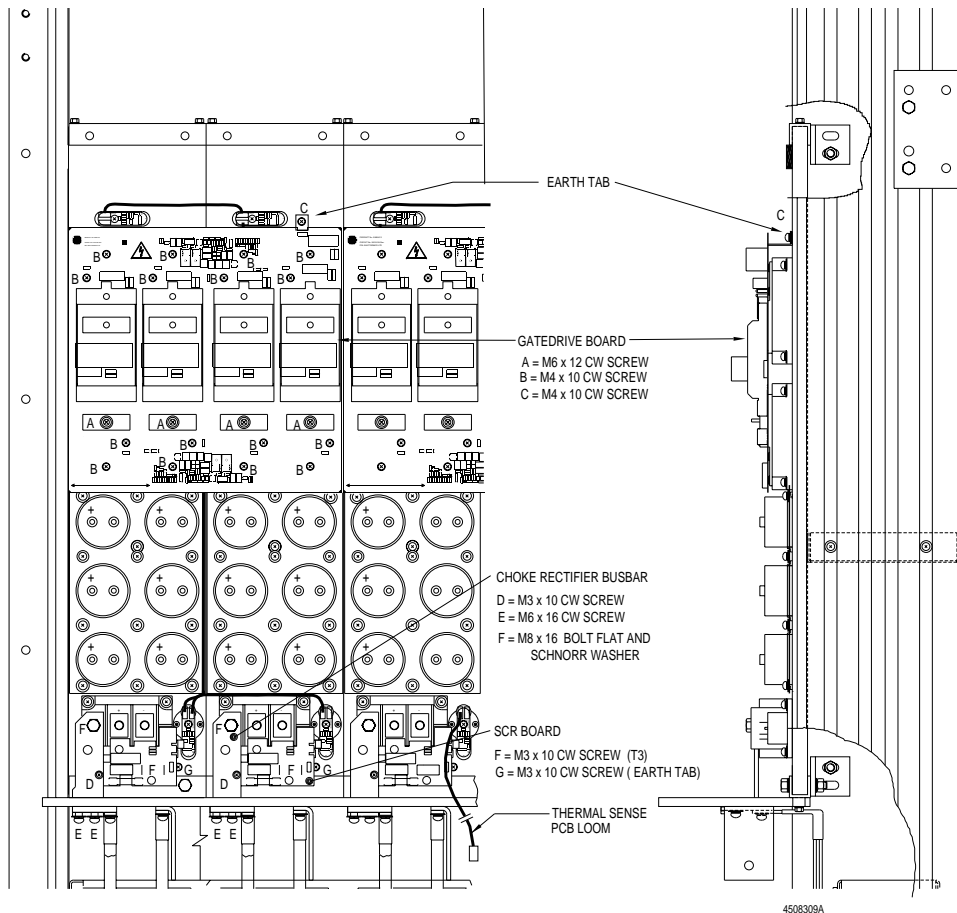


Figure 6.14: Frame 6 Snubber and SCR Board

6.2.7 SERVICING THE IGBT

Refer to the upper section of figure 6.13.

Each IGBT is held by 4 off M6x16 CW screws, a thermstrate is used between the IGBT and heatsink to ensure good thermal contact. Remove the old IGBTs and clean the heatsink surface.

- 1) Do not remove the gate emitter shorting link on the new IGBTs.
- 2) Use a new thermstrate, avoid touching the surface of it, do not use the paper packer.
- 3) Replace the 4 off M6x16 CW screws (do not tighten yet) and push the IGBT block towards the base of the Elite, then tighten the screws. This will align the replacement blocks in the same manner as the remaining half phases.
- 4) Remove the gate emitter shorting ribbon from the IGBTs and replace the Gatedrive board.

6.2.8 SCR/DIODE BLOCK SERVICE

Refer to the lower section of figure 6.12.

Each SCR/diode block is held by 4 off M5x16 CW screws, and a thermstrate is used between the SCR/diode block and heatsink to ensure a good thermal contact. Remove the old SCR/diode block and clean the heatsink surface.

- 1) Use a new thermstrate, avoid touching the surface of it, do not use the paper packer.
- 2) Replace the 4 off M5x16 CW screws (do not tighten yet) and push the SCR/diode block towards the bottom of the Elite, then tighten the screws. This will align the replacement blocks in the same manner as the remaining half phases.

500V MICROTHERMS

The 500V models have three microtherms connected to and located above the top set of Thermal Sense boards.

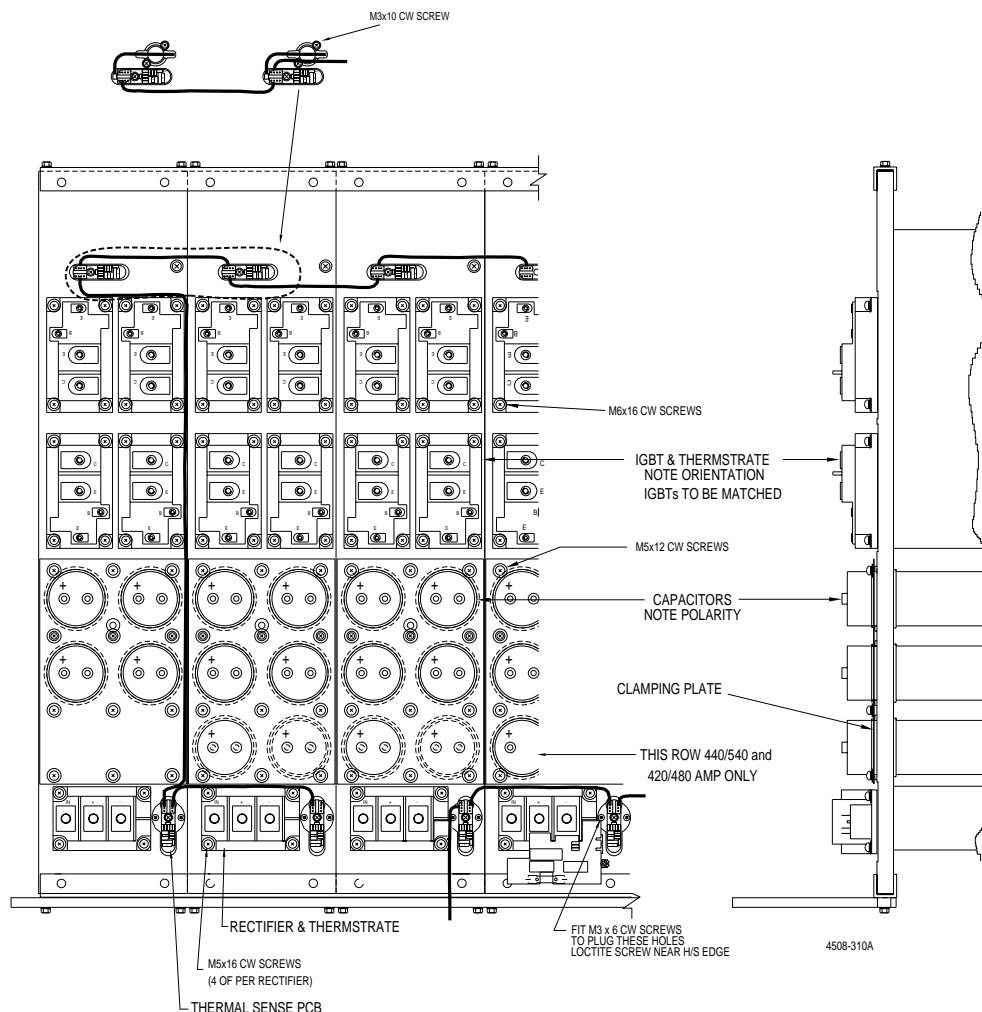


Figure 6.15: Frame 6 IGBT, Capacitors and SCR Level



6.2.9 SERVICING THE CAPACITOR

The capacitors are mounted through the heatsink with the bulk of the capacitor in the main cooling airflow at the back of the machine. Sealing rings are used to prevent air leakage through to the inside of the machine.

- 1) To remove the capacitors, undo 15 off M5 x 12 Phillips screws. See figure 6.15.

Replacing the Capacitors

- 1) The capacitors should be installed using a jig, PDL part number 5101-190, this ensures the height and rotational position are exact.

The sealing rings must be fitted to the capacitors at 23.5mm below the top of the terminal post. Place the capacitors in the heatsink and loosely screw down the clamping plate. Fit the jig to the capacitors then tighten the clamping plate screws. If a jig is not available precise fitting of the individual capacitors is required. Refer to figure 6.16. Fit the capacitor sealing rings exactly as shown, this should help to align the capacitor terminal post at 29.5 mm above the heatsink, when the clamping plate is secured. The rotational alignment of the post is also critical to prevent cross threading of the screws into the capacitor terminal post when the Sheet Bus is attached. Slight adjustments may need to be made as the clamping plate is clamped down.

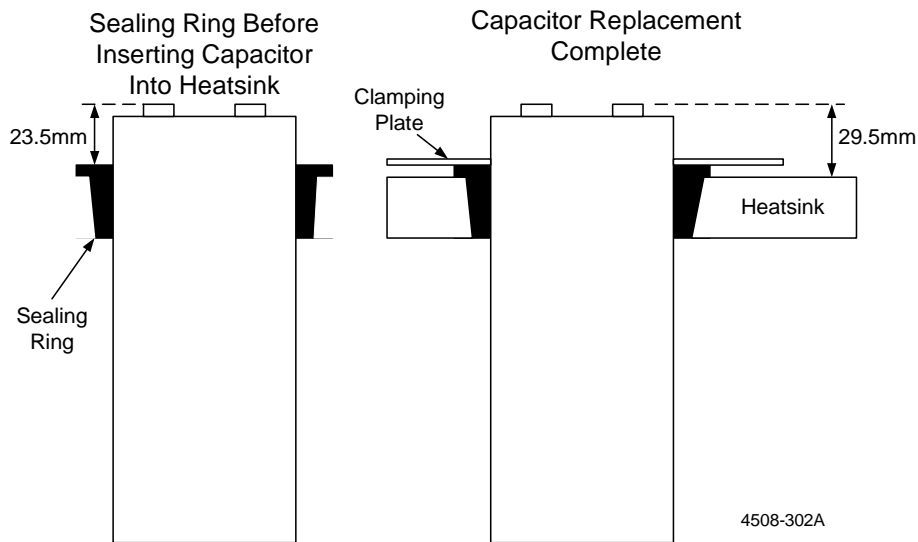


Figure 6.16: Capacitor Replacement

6.2.10 500V MODELS EXTERNAL FAN POWER SUPPLY

The 500V models have a linear AC to 24Vdc power supply for the external fans. This is located directly above the internal cooling fan and is accessed by removing the gold coloured panel above the electronics cabinet. The panel is held by 6 off M5 x 10 CW screws.

An exploded assembly view is shown in figures 6.17 and 6.18.

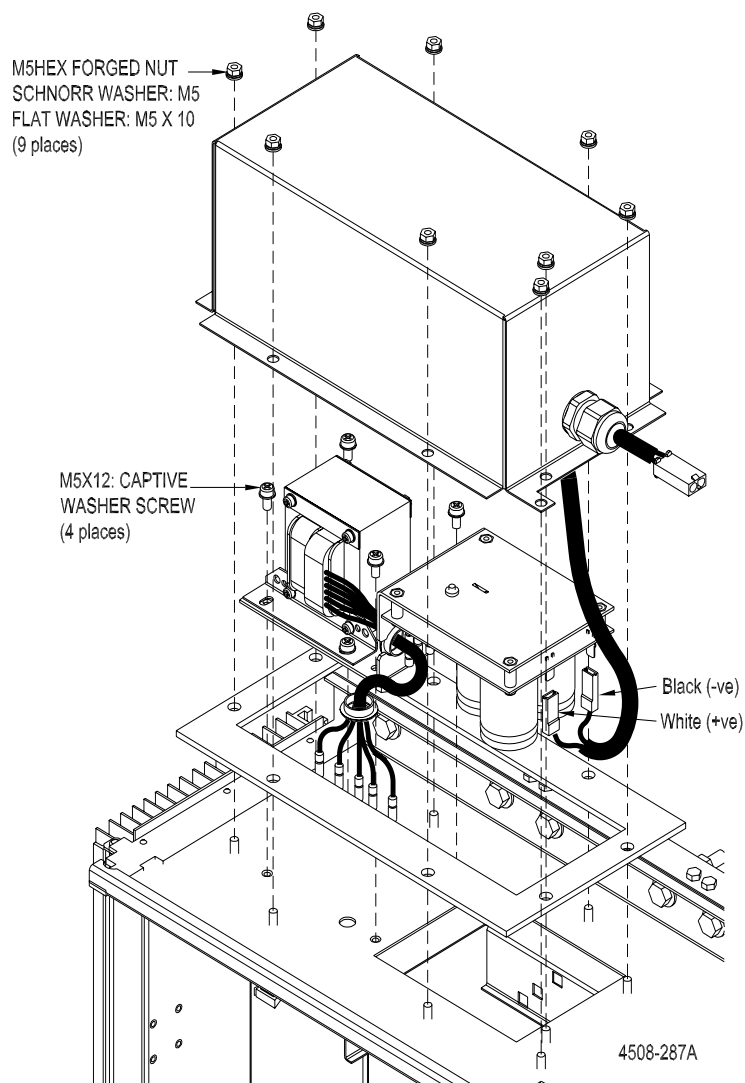


Figure 6.17: Frame 5 to 7 500V External Fan Supply

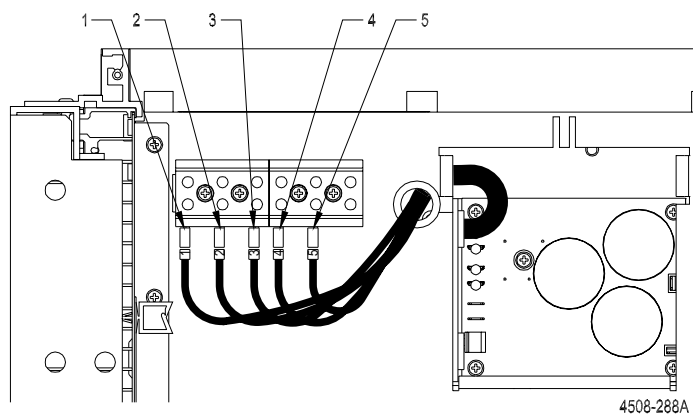


Figure 6.18: Frame 5 to 7 500V External Fan Supply Connections

Notes